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CURRAN et al.(10) **Pub. No.: US 2018/0263130 A1**(43) **Pub. Date: Sep. 13, 2018**(54) **ABRASION-RESISTANT SURFACE FINISHES
ON METAL ENCLOSURES**(52) **U.S. Cl.**CPC **H05K 5/04** (2013.01); **H05K 5/0086**
(2013.01); **G06F 1/1656** (2013.01)(71) Applicant: **Apple Inc.**, Cupertino, CA (US)(72) Inventors: **James A. CURRAN**, Morgan Hill, CA
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(57)

ABSTRACT

Composite coatings having improved abrasion and dent resistance are described. According to some embodiments, the composite coatings include an outer hard layer and an intermediate layer between the outer hard layer and a metal substrate. The intermediate layer can have a hardness that is less than the hard outer layer but greater than the metal substrate. In this arrangement, the intermediate layer can act as a structural support that resists plastic deformation when an impact force is applied to the coating. In some embodiments, the intermediate layer is composed of a porous anodic oxide material. In some embodiments, the outer hard layer is composed of a ceramic material or a hard carbon-based material, such as diamond-like carbon.

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